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Environmental Technology Site

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**JKH-026-97**

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BARTHEL, J.M.		
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FITZ, R.C.		
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MCANALLY, J.L.		
POWER, A.P.		
REED, A.B.		
RYSON, A.M.		
WAGNER, M.J.		
WHEELER, M.		

*J. Gregorio* ✓  
*J. Hildegarde* ✓  
*Tranac, R.* ✓  
*W. Kengast* ✓

RMRS RECORDS (2) X X

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Date: **11-4-97**

IN REPLY TO RF CC NO.:

ACTION ITEM STATUS:  
☐ PARTIAL/OPEN  
☐ CLOSED

LTR APPROVALS:

ORIG. & TYPIST INITIALS:  
*RF/AW*

November 4, 1997

Jennifer Uhland  
ER/WM&I Operations  
Kaiser Hill Company L.L.C.  
Rocky Flats Environmental Technology Site

**FIELD SAMPLING PLAN FOR PLANT MATERIALS IN THE AREA OF THE SOLAR  
PONDS PLUME - JKH-026-97**

Rocky Mountain Remediation Services, L.L.C. (RMRS) is pleased to provide the enclosed document entitled "Field Sampling Plan for Plant Materials in the area of the Solar Ponds Plume" (RF/RMRS-97-112). This plan sets out the field sampling methods for plant materials to ascertain preliminary knowledge regarding uptake of uranium by native vegetation in the solar ponds plume area. This investigation is one of the activities which will support a final determination of the best alternative for remediation of ground water contamination, as described in RMRS' previous report, "Solar Ponds Plume Remediation and Interceptor Trench System Water Treatment Study" (RF/RMRS-97-093.UN).

Please review the Field Sampling Plan and forward to the Department of Energy. Comments should be returned to Bob Fiehweg at extension 7403. The plan is ready for immediate sampling events this fall and can also be implemented for further work during the next growing season, if early results indicate additional sampling is merited. RMRS has implemented the necessary document control requirements for this field work.

Please feel free to contact me at extension 4974 if you have any questions.

John Hopkins  
Manager, Site Closure

RF/aw

Attachment:  
As Stated

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11/11/97  
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## 1. INTRODUCTION

The purpose of this Field Sampling Plan (FSP) is to direct the collection of samples from existing vegetation in the area of North Walnut Creek and Rock Creek drainages. This activity supports the field evaluations in and around the area of the Solar Ponds Plume and the Interceptor Trench System. This specific task will provide preliminary information on the potential for native plants at the Rocky Flats Environmental Technology Site (the Site) to uptake and store uranium. The objective of this FSP is to describe the specific data needs, sampling and analysis requirements, data handling procedures, and associated Quality Assurance/Quality Control (QA/QC) requirements for this investigation. All work will be performed in accordance with the RMRS Quality Assurance Program Description (QAPD) (RMRS 1997a).

### 1.1. Background

The area of the Solar Ponds Plume is known to be contaminated with high levels of nitrate due to past waste storage practices in the Solar Evaporation Ponds. Other contaminants have been found in the Solar Ponds Plume area in the past, but on-going data evaluations and groundwater monitoring show levels generally consistent with background levels established for the Site. Currently, groundwater from the Solar Ponds Plume is collected in the Interceptor Trench System (ITS) and stored in the Modular Storage Tanks (MSTs) prior to treatment in the Site's process waste facility, Building 374. An alternative to the current treatment method is being sought. A recently completed alternatives evaluation (RMRS 1997b) identified four cost-effective alternatives to address contamination in the area of the plume. One of the alternatives is phytoremediation, the use of deep rooted perennial plants *in situ* to remove contaminants. It is well known that plants use nitrate as a nutrient, but the uptake of uranium is less understood. In an effort to address potential concerns about the transfer of uranium from the groundwater matrix to plant materials, including tree leaves, stems, branches and roots, a limited survey is being conducted to look for evidence of uranium uptake by native vegetation in the area of the Solar Ponds Plume.

## 2. PROJECT AND DATA QUALITY OBJECTIVES

The objective of this FSP is to identify the steps that will be taken to collect plant material, and convey the samples to the selected analytical laboratory for analysis. The contaminant of concern for this investigation is uranium. Data requirements to support this project were developed from a review of literature sources and consultation with experts in plant biochemistry. In addition to uranium analyses, collected material will be measured for moisture content and a nutrient analysis of phosphorus (P), potassium (K), and nitrogen (N).

**Table 1. Analytical Requirements**

Analysis Method	Number of Field Samples	Number of QC Samples	Total Number Samples	Containers, Holding Times, Preservatives
Alpha spectroscopy for U 233,234, and U 238	Leaves - 4 Petioles - 4 Branch - 4 Rootlet - 4 Grass - 6	1 duplicate ( 1 per 20 samples)	23	Ziploc™ bags, dilute chlorine bleach solution, 6 months
Moisture Content	22 as above	1 duplicate ( 1 per 20 samples)	23	Same
Plant Nutrients: P,K,N	22 as above	1 duplicate ( 1 per 20 samples)	23	Same

Samples will be collected from existing cottonwood trees (*Populus deltoides* or *Populus angustifolia*) and representative grasses (e.g. *Andropogon* sp., *Bromus* sp., *Festuca* sp., etc.) in the area of the ITS, where uranium should be found if there is uranium uptake, and in an area undisturbed by industrial activities, the upper Rock Creek drainage, to provide background levels. A minimum of 50 grams of plant material of each type from each location is required for the necessary analyses.

### 2.1. Sampling of Trees

Two sampling locations are proposed, one in the North Walnut Creek drainage in the vicinity of surface water sampling station SW093 and one in the Rock Creek drainage, at or below the holding pond at the location known as Lindsey Ranch. The plant material collected from the cottonwood trees will include leaves, leaf petioles, stems, short segments of small branches no greater than 1 inch in diameter, and, if possible, small, shallow roots. These materials shall be collected from different

locations on the trees selected for sampling. Two trees shall be sampled at each location, one from a tree less than 20 inches DBH (diameter at breast height) and one from a tree greater than 20 inches DBH. All sampled materials must be reachable by a person of average height from ground level. Approximately 50 grams of plant tissue shall be collected from each location and placed in a Ziploc™ bag. Once placed in the bag, the sample shall be sprayed with a dilute chlorine bleach solution (approximately 5% bleach) before the bag is sealed to control fungal growth and minimize sample degradation. Sample numbers for the tree material shall include a code to identify the drainage, tree material, and the tree size (i.e., NWCT20+, RCT20-).

## 2.2. Sampling of Grass

Grass will be sampled along two transects; one transect will be in the North Walnut Creek drainage in the area of the ITS south of the Interceptor Trench Pump House, and one will be in the Rock Creek drainage north of the holding pond at Lindsey Ranch. Two groundwater monitoring wells approximately 100 feet apart will be selected to serve as end points for the transect in the ITS area; noticeable landmarks or wood stakes shall be used to delineate the transect, also approximately 100 feet in length, in the Lindsey Ranch area. Each transect shall be divided into eight equal sections, providing nine sampling nodes (including the endpoints). Grass samples will be collected from three consecutive sampling nodes and composited to form one sample. The samplers shall draw each transect in the logbook and indicate which nodes were composited for each sample. The resulting sample shall contain approximately 50 grams of material. The sample shall be sprayed with the dilute chlorine bleach solution prior to being sealed in the Ziploc™ bag. Sample numbers for grass shall include a code to identify the drainage, type of plant material, and the nodes composited (i.e., NWCG1-3).

## 3. SAMPLING AND ANALYSES

The analytical requirements for the samples to be collected under this FSP are described in Table 1, and special sample handling requirements have been detailed. Samples will be handled in accordance with FO.10 Receiving, Labeling, and Handling Environmental Material Containers, and recommendations by the selected analytical laboratory.

If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and detailed in the field logbook and the resulting data is comparable and adequate to meet the objectives of the project.

#### **4. DATA MANAGEMENT**

A field logbook will be used during this investigation by RMRS technical staff. Entries in the logbook will identify specific sampling locations, the sample number, the number and types of samples collected at each location, and the time and date of field activities. In addition, the field crew will fill out a chain-of-custody record which will record the sample number, location, time of collection, analyses requested, and sampler's signature. One copy of the chain-of-custody record will be retained by the samplers and the original will accompany the samples to the laboratory.

##### **4.1. Project Completion**

The results will be compiled and placed in the project files. Sampling locations and results will also be recorded in Geographical Information System (GIS) files maintained as part of the Site remediation efforts. At the end of the project, all records and field documentation will be turned over to the records center.

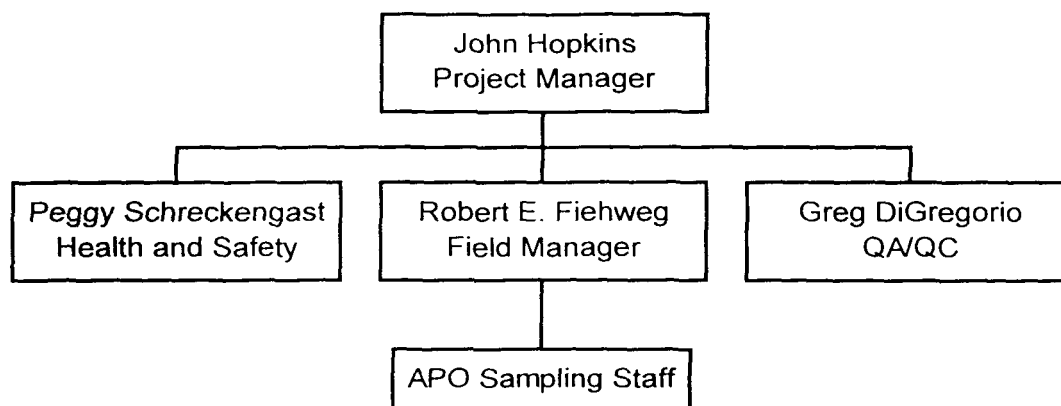
##### **4.2. Quality Assurance**

Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02 Evaluation of ERM Data for Usability in Final Reports. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Because the objective of the preliminary sampling effort is to establish whether uranium is present in plant materials, the analytical results need not meet the most stringent PARCC requirements.

## 5. PROJECT ORGANIZATION

The project organization chart is presented in Figure 1. The ER Projects Group is responsible for management and coordination of resources dedicated to the project. Other organizations assisting with the implementation of this project are: RMRS Program Compliance, RMRS Health and Safety, and RMRS Quality Assurance.

Figure 1. ITS Investigation Organization

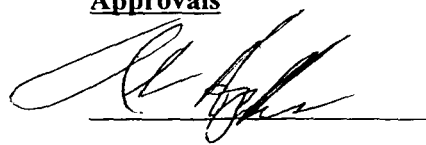


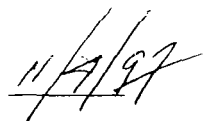
## 6. REFERENCES

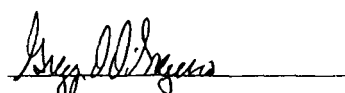
RMRS, 1997a, *RMRS Quality Assurance Program Description*, RMRS-QAPD-001, Rev. 1, January.

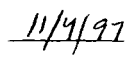
RMRS, 1997b, *Solar Ponds Plume Remediation and Interceptor Trench System Water Treatment Study*, RF/RMRS-97-093.UN, September, 1997

### Approvals

  
John Hopkins

  
Date

  
Greg Digregorio

  
Date